

CLAIMS

WE CLAIM:

1. A hand-held laser fusion welding assembly for treating a workpiece, comprising:
 - a main body dimensioned to be grasped by a hand and adapted to couple to at least a laser delivery system;
 - a nozzle coupled to the main body and having an aperture through which laser light from the laser delivery system may pass; and
 - a laser reflection shield coupled to, and at least partially surrounding, either the nozzle or the main body, the laser reflection shield constructed at least partially of a material that reflects at least a portion of the laser light that passes through the nozzle aperture and is reflected by the workpiece.
2. The assembly of Claim 1, wherein the laser reflection shield is configured to be movable on, and removable from, the main body and nozzle.
3. The assembly of Claim 1, wherein:
 - the reflected laser light is characterized by at least a wavelength; and
 - the material of which the laser reflection shield is at least partially constructed has low absorption characteristics at the reflected laser light wavelength.
4. The assembly of Claim 1, wherein the laser reflection shield is configured and constructed to diffusely reflect the laser light reflected by the workpiece.
5. The assembly of Claim 1, wherein the laser reflection shield comprises:

a clamp having at least a front side and a back side; and
a shield plate coupled to clamp front side.

6. The assembly of Claim 5, further comprising:
a plurality of clamps from which the clamp is selected; and
a plurality of shield plates from which the shield plate that is coupled to
the clamp front side is selected.

7. The assembly of Claim 5, wherein:
the clamp front side has a recess formed therein; and
the shield plate is disposed at least partially within the recess.

8. The assembly of Claim 5, wherein the clamp is an annulus having
an inner peripheral surface and an outer peripheral surface, each peripheral surface
disposed between the clamp front and back sides.

9. The assembly of Claim 8, wherein the annulus includes a first end
and a second disposed adjacent one another, and wherein the clamp further
comprises:

an adjustable fastener coupled to the clamp, the adjustable fastener
configured to move the first and second ends relative to one another.

10. The assembly of Claim 9, wherein the adjustable fastener
comprises a threaded fastener that extends through the annulus outer peripheral
surface, through the annulus first end, and at least partially into the second end.

11. The assembly of Claim 5, further comprising:
a plurality of threaded openings formed in the clamp front side;
a plurality of openings extending through the shield plate, each shield plate opening collocated with one of the threaded openings; and
a plurality of threaded fasteners, each fastener extending through one of the shield plate openings and into one of the threaded openings.

12. The assembly of Claim 1, further comprising:
one or more proximity sensors coupled to the laser reflection shield, each proximity sensor configured to sense a proximity of the laser reflection shield to the workpiece and operable, in response thereto, to supply proximity signals representative thereof.

13. The assembly of Claim 12, further comprising:
one or more sensor apertures formed through the reflection shield,
wherein each proximity sensor is mounted proximate one of the reflections shield sensor apertures.

14. The assembly of Claim 12, further comprising:
a control circuit coupled between each proximity sensor and the laser delivery system, the control circuit coupled to receive proximity signals and operable, in response thereto, to selectively allow or prevent laser light delivery from the laser delivery system.

15. A laser reflection shield for reflecting laser light, comprising:
a clamp adapted to mount on a hand-held laser welding wand, the clamp having at least a front side and a back side; and
a shield plate coupled to the clamp front side, the shield plate constructed at least partially of a material that reflects at least a portion of the laser light.
16. The shield of Claim 15, wherein:
the laser light is characterized by at least a wavelength; and
the material of which the shield plate is at least partially constructed has low absorption characteristics at the laser light wavelength.
17. The shield of Claim 15, wherein the shield plate is configured and constructed to diffusely reflect the laser light.
18. The shield of Claim 15, further comprising:
a plurality of clamps from which the clamp is selected; and
a plurality of shield plates from which the shield plate that is coupled to the clamp front side is selected.
19. The shield of Claim 15, wherein:
the clamp front side has a recess formed therein; and
the shield plate is disposed at least partially within the recess.
20. The shield of Claim 19, wherein the clamp is an annulus having an inner peripheral surface and an outer peripheral surface, each peripheral surface disposed between the clamp front and back sides.

21. The shield of Claim 20, wherein the annulus includes a first end and a second end disposed adjacent one another, and wherein the clamp further comprises:

an adjustable fastener coupled to the clamp, the adjustable fastener configured to move the first and second ends relative to one another.

22. The shield of Claim 21, wherein the adjustable fastener comprises a threaded fastener that extends through the annulus outer peripheral surface, through the annulus first end, and at least partially into the second end.

23. The shield of Claim 15, further comprising:
a plurality of threaded openings formed in the clamp front side;
a plurality of openings extending through the shield plate, each shield plate opening collocated with one of the threaded openings; and
a plurality of threaded fasteners, each fastener extending through one of the shield plate openings and into one of the threaded openings.

24. The shield of Claim 15, further comprising:
one or more proximity sensors coupled to the laser reflection shield, each proximity sensor configured to sense a proximity of the laser reflection shield to a workpiece and operable, in response thereto, to supply proximity signals representative thereof.

25. The shield of Claim 24, further comprising:
one or more sensor apertures formed through the reflection shield,
wherein each proximity sensor is mounted proximate one of the reflections shield sensor apertures.